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FOOD HABITS OF BALD EAGLES ON SANTA CATALINA ISLAND,
JANUARY - JULY 1993

A report submitted to the
Damage Assessment Office
U.S. Fish and Wildlife Service
Sacramento Field Office
Sacramento, California

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INTRODUCTION

This document serves as an addendum to the report on the food habits of bald eagles on Santa Catalina Island dated March 1997. That report covered data collected in 1991 and 1992, and was an effort to document the prey base utilized by bald eagles on the island and to collect prey items for contaminant analysis. The data presented in this document is an expansion of the previous effort and encompasses the period from 23 January through 31 July 1993.

Because the study area and data collection methodologies were the same as those presented in the previous report, they will not be repeated here.

RESULTS

A total of 178 hours were spent observing bald eagles to obtain foraging data. Observations from land constituted 14 hours of observation time and the remaining 164 hours of observation were conducted from the water (Table 1). Observation time included only periods that eagles were in view. An additional 175 hours were spent traveling (by boat or vehicle) to and from eagle foraging areas, and 112 hours were spent searching for the eagles once within their foraging areas (Table 2). Observations of the nests during the breeding season to obtain food habits data constituted another 268 hours of field time.

Table 1. Hours of field observation (excluding travel and search time) conducted on bald eagles on Santa Catalina Island, California, from January 1993 through July 1993.

Month	Observation Time (hrs)		
	Land	Boat	Total
January	5.0	0.0	5.0
February	2.0	54.5	56.5
March	3.0	71.0	74.0
April	4.0	12.5	16.5
May	0.0	7.0	7.0
June	0.0	7.0	7.0
July	0.0	12.0	12.0
Total	14.0	164.0	178.0

Winter weather caused rough seas and limited the amount of quality observation time available to view foraging eagles at certain territories. Occasional mechanical difficulties with the regular observation vessel made surveillance from a less sea-worthy boat necessary, further restricting access to certain territories. As a result, observation time at the different eagle territories (excluding nest observations) was not equal (Table 2).

Foraging Success

A total of 35 foraging attempts were observed, of which 54% were successful (Table 3). Capture was the most common foraging behavior used (69%) followed by kleptoparasitism (14%), scavenging (11%) and unknown (6%) (Table 4). Of the five kleptoparasitic foraging attempts, three were directed at western gulls (*Larus occidentalis*) and two at brown pelicans (*Pelecanus occidentalis*).

Table 2. Total travel, search and observation time (excluding nest observations) by bald eagle territory on Santa Catalina Island, California, from January 1993 through July 1993. Efforts towards observing all immature eagles are combined and listed under territory.

Territory	Travel Time	Search Time	Observation Time
Pinnacle Rocks	28.5	6.0	30.0
Seal Rocks	54.5	17.0	45.0
Twin Rocks	17.0	6.0	25.0
Troqua Springs	27.0	22.5	30.0
West End	35.0	0.5	42.0
Immature Eagles	13.0	57.0	6.0
TOTAL	175.0	112.0	178.0

Collection of Prey and Surrogate Samples

Prey and surrogate samples collected for organochlorine contaminant analysis included fish (four species), birds (two species), and mammals (one species). Four prey items actually foraged upon by the eagles and collected from the nest included two fish species, giant kelpfish (*Heterostichus rostratus*) and kelp bass (*Paralabrax clathratus*) (Table 5). In addition, an eagle was flushed from a rock fish (*Sebastes spp.*) which was then collected by project personnel.

Three eagles (one adult and two juveniles) were flushed from a California sea lion (*Zalophus californianus*) carcass, from which tissues were later collected.

A total of five birds were collected as surrogate samples. Birds collected included four California gulls (*Larus californicus*) and one pacific loon (*Gavia arctica*) (Table 5). Four birds were collected by firearm, and one injured bird was collected by hand. We collected surrogate fish samples after observing a bald eagle foraging behind a fishing boat chumming Pacific sardines (*Sardinops sagax*).

Prey Species Composition

Table 3. Foraging success by month for bald eagles on Santa Catalina Island, California, from January 1993 through July 1993.

Month	Total No. Foraging Attempts	No. Successful Foraging Attempts	Percent Foraging Success (%)	Prey Items Taken Per Observation Hour
January	0	0	0.0	0.00
February	11	5	45.5	0.09
March	15	9	60.0	0.12
April	6	3	50.0	0.18
May	2	2	100.0	0.29
June	0	0	0.0	0.00
July	1	0	0.0	0.00
TOTAL	35	19	54.3	-----

For all sampling methods, there were 10 fish species, 10 bird species, and two mammal species positively identified (Table 6). Three fish species could be identified only to genus (Table 6). Smelt species (*Atherinops spp.* and *Leuresthes spp.*) were indistinguishable in the field and therefore grouped for data collection and analysis. Unidentified fish accounted for 72% of all fish taken by the eagles.

Table 4. Foraging success of different foraging behaviors used by bald eagles on Santa Catalina Island, California, January 1993 through July 1993.

Foraging Behavior	Total No.	No. Successful	Percent Success
Capture	24	11	46.0
Kleptoparasitism	5	2	40.0
Scavenge	4	4	100.0
Unknown	2	2	100.0

Table 5. Prey items of bald eagles and surrogate samples collected for organochlorine analysis on Santa Catalina Island, California, from January 1993 through July 1993.

Prey Species	No. Surrogate Samples Collected	No. Prey Items Collected
FISH		
Giant Kelpfish	0	1
Kelp bass	0	1
Pacific Sardine	2	0
Sebastes spp.	0	1
BIRDS		
California gull	4	0
Pacific Loon	1	0
MAMMALS		
California sea lion ^a	0	1

^a Prey item fed upon by three individual bald eagles.

Table 6. Minimum numbers of bald eagle prey items and percent diet composition using all sampling methods on Santa Catalina Island, California, from January 1993 through July 1993.

Food Item	N	Individuals	
		% of Total ^a	% of Taxon ^a
<u>FISH</u>			
Unknown fish	67	59.3	72.0
Pacific sardine (<i>Sardinops sagax</i>)	4	3.5	4.3
Kelp bass (<i>Paralabrax clathratus</i>)	4	3.5	4.3
Unknown rockfish (<i>Sebastes spp.</i>)	4 ^b	3.5	4.3
Blacksmith (<i>Chromis punctipinnis</i>)	2	1.8	2.2
Smelt spp. (<i>Atherinops</i> or <i>Leurenthes</i>)	2	1.8	2.2
Horn shark (<i>Heterodontus francisci</i>)	2	1.8	2.2
Skipjack tuna (<i>Katsuwonus pelamis</i>)	2	1.8	2.2
California barracuda (<i>Sphyreaena argentea</i>)	1	tr	1.1
Giant kelpfish (<i>Heterostichus rostratus</i>)	1 ^b	tr	1.1
Unknown mackerel (<i>Scomber spp.</i> , <i>Trachurus spp.</i>)	1	tr	1.1
California sheephead (<i>Semicossphyus pulcher</i>)	1	tr	1.1
White surfperch (<i>Phanerodon furcatus</i>)	1	tr	1.1
Brown smoothhound (<i>Mustelus californicus</i>)	1	tr	1.1
Fish Subtotal	93	82.3	
<u>BIRDS</u>			
Western gull (<i>Larus occidentalis</i>)	5 ^b	4.4	33.3
Heermann's gull (<i>Larus heermanni</i>)	1	tr	6.7
Surfbird (<i>Aphriza virgata</i>)	1	tr	6.7
Sooty shearwater (<i>Puffinus griseus</i>)	1 ^b	tr	6.7
Black-vented shearwater (<i>Puffinus opisthomelas</i>)	1 ^b	tr	6.7
Brandt's cormorant (<i>Phalacrocorax penicillatus</i>)	1 ^b	tr	6.7
Ring-billed gull (<i>Larus delawarensis</i>)	1 ^b	tr	6.7
Cassin's auklet (<i>Ptychoramphus aleuticus</i>)	1 ^b	tr	6.7
Common raven (<i>Corvus corax</i>)	1 ^b	tr	6.7
Xantus' murrelet (<i>Synthliboramphus hypoleucus</i>)	1	tr	6.7
Unknown birds	1	tr	6.7
Bird Subtotal	15	13.3	

Table 6. (cont'd.) Minimum numbers of bald eagle prey items and percent diet composition using all sampling methods on Santa Catalina Island, California, from January 1993 through July 1993.

Food Item	N	Individuals	
		% of Total ^a	% of Taxon ^a
<u>MAMMALS</u>			
Unknown mammals	2	1.8	50.0
California sea lion (<i>Zalophus californianus</i>)	1 ^d	tr	25.0
Feral goat (<i>Capra hircus</i>)	1	tr	25.0
Mammal Subtotal	4	3.5	
<u>INVERTEBRATES</u>			
Unknown invertebrates	1 ^b	tr	100
Total Food Items	113 ^c	100	

^atr=trace amount representing less than 1% of the total.

^bSpecies that were described only from nest or feeding perch remains.

^cTo prevent double counting of prey remains, total food items may be less than the sum of foraging observations, nest observations, perch remains, and nest remains.

^dThe number of California sea lions represents total number of individuals observed being fed upon by bald eagles. The total number of times eagles were observed to feed on these carcasses is 3.

Percent Diet Composition

Based on the minimum number of individuals for all sampling methods, the percent diet composition for eagles was 82.3% fish, 13.3% birds, 3.5% mammals, and 0.9% invertebrates (n = 113) (Table 6). Most (72%) fish prey items could not be identified to species, and comprised the greatest percentage of the eagle's diet. Western gulls were the most common bird species preyed upon, and were the most common identifiable item in the diet (4.4%).

Percent diet composition varied among months and among individual eagles (Table 7 and 8), however, because of small sample sizes it was not appropriate to test for significant differences between these factors.

Sampling Method Comparisons

Sampling methods used to identify prey items varied. Biases in interpreting food habits data were present in each of the methodologies employed. Fish and birds were represented in each sampling method, while mammals were found in all but nest observations and invertebrates only in perch remains. No method was successful in identifying all prey items to species, however, the foraging observation and prey remains methods were successful in identifying all collected prey items to taxon.

Percent diet composition of the eagles varied among sampling methods (Table 9). The foraging observation method detected the greatest percentage of mammals compared to other sampling methods. Fish comprised the greatest percentage of prey items for both foraging and nest observation methods, with 73.7% and 94.7%, respectively (Table 9).

Table 7. Percent diet composition by month for bald eagles on Santa Catalina Island, California, from January 1993 through July 1993. These data represent results using observational methods only.

Month	Fish (%)	Bird (%)	Mammal (%)	Invertebrate (%)
January (n=0)	0.0	0.0	0.0	0.0
February (n=6)	50.0	0.0	50.0	0.0
March (n=11)	81.8	9.1	9.1	0.0
April (n=41)	90.2	9.8	0.0	0.0
May (n=31)	100.0	0.0	0.0	0.0
June (n=6)	100.0	0.0	0.0	0.0
July (n=0)	0.0	0.0	0.0	0.0

Table 8. Percent diet composition for individual eagles (n = total number of prey) based on observational methods, on Santa Catalina Island, California, from January 1993 through July 1993. Unidentified eagles and prey unidentified to taxon were excluded.

Territory	Eagle Identification	Fish (%)	Bird (%)	Mammal (%)	Invertebrate (%)
PR	K40 (n=4)	100.0	0.0	0.0	0.0
PR	K65 (n=29)	96.6	3.4	0.0	0.0
PR	U-PR (n=12)	75.0	25.0	0.0	0.0
SR	K67 (n=5)	80.0	0.0	20.0	0.0
SR	K00 (n=0)	0.0	0.0	0.0	0.0
TR	CHT (n=0)	0.0	0.0	0.0	0.0
TS	K22 (n=5)	80.0	0.0	20.0	0.0
WE	U-WE (n=38)	97.4	0.0	2.6	0.0
-- ^b	K13 (n=1)	0.0	0.0	100.0	0.0
-- ^b	K25 (n=1)	0.0	0.0	100.0	0.0

^a PR = Pinnacle Rock territory, SR = Seal Rocks territory, TR = Twin Rocks area, TS = Torqua Springs area, WE = West End territory.

^b Juvenile eagles without an established territory.

Table 9. Percent diet composition by observation method for bald eagles on Santa Catalina Island, California, from January 1993 through July 1993.

Sampling Method	Fish (%)	Bird (%)	Mammal (%)	Invertebrate (%)
Foraging Observations (n=19)	73.7	5.3	21.0	0.0
Nest Observations (n=76)	94.7	5.3	0.0	0.0
Prey Remains (n=21)	33.3	52.4	9.5	4.8

DISCUSSION

The ability of project personnel to identify prey items to lower taxonomic levels was limited by several factors: 1) poor lighting conditions (low light, backlighting, heatwaves, and haze) compromised viewing, 2) rough ocean conditions made pursuit of foraging eagles difficult, 3) feeding perches were typically high above the surface of the ocean making viewing difficult after the eagle landed with a prey item, and 4) wave action prevented the use of more powerful optical devices for identifying prey.

Nest viewing from observation points on land was hampered by the lighting conditions listed above, as well as depth of the nest bowl and the relative position of the eagles and prey items on the nest.

On 17 March 1993 the eagle egg(s) in the nest at the Seal Rocks territory were found broken. On May 14, 1993 the eaglet fostered into the nest at the Pinnacle Rock territory was found dead in the nest. Attempts to attract the adults back to the nest with dummy eggs failed. With the failure of the Seal Rocks nest and the loss of the Pinnacle Rocks chick at approximately six weeks of age, only one nest was available during the breeding season for the purpose of determining food habits. This explains, in part, the large discrepancy between the number of prey items observed in 1992 compared to 1993.

Data collected from the start of the food habits investigation in 1991 through its completion in 1993 have been combined in Appendix A. This appendix contains the table numbers from the 1991-1992 report for easy comparison. Six fish species and five bird species not found in the 1991-1992 data were identified in 1993 as prey items (Appendix A - Table 5). This brings the number of known species of fish and birds preyed upon by the eagles to 24 and 19, respectively.


David K. Garcelon

2 April 1997
Date

APPENDIX A.

Table 1. Hours of field observation (excluding travel and search time) conducted on bald eagles on Santa Catalina Island, California, from December 1991 through July 1993.

Month	Observation Time (hrs)		
	Land	Boat	Total
January	22.0	27.0	49.0
February	22.5	72.0	94.5
March	78.5	73.0	151.5
April	47.5	25.0	72.5
May	10.5	63.0	73.5
June	22.5	27.5	50.0
July	0.0	57.5	57.5
August	4.0	69.5	73.5
September	30.0	48.0	78.0
October	64.0	15.5	79.5
November	12.0	0.0	12.0
December	28.0	6.0	34.0
Total	341.5	484.0	825.5

APPENDIX A. (cont'd.)

Table 2. Foraging success by month for bald eagles on Santa Catalina Island, California from December 1991 through July 1993.

Month	Total No. Foraging Attempts	No. Successful Foraging Attempts	Percent Foraging Success (%)	Prey Items Taken Per Observation Hour
January	9	5	55.6	0.10
February	15	6	40.0	0.06
March	21	14	66.7	0.09
April	9	6	66.7	0.08
May	16	13	81.2	0.18
June	2	1	50.0	0.02
July	14	6	42.8	0.10
August	19	14	73.7	0.19
September	9	8	88.9	0.10
October	14	12	85.7	0.15
November	6	6	100.0	0.50
December	8	5	62.5	0.15
TOTAL	142	96	67.6	-----

Table 3. Foraging Success of different foraging behaviors used by bald eagles on Santa Catalina Island, California, December 1991 through July 1993.

Foraging Behavior	Total No.	No. Successful	Percent Success
Capture	100	62	62.0
Kleptoparasitism	19	11	57.9
Scavenge	16	16	100.0
Unknown	7	7	100.0

APPENDIX A. (cont'd.)

Table 4. Prey items of bald eagles and surrogate samples collected for organochlorine analysis on Santa Catalina Island, California, from December 1991 through July 1993.

Prey Species	No. Surrogate Samples Collected	No. Prey Items Collected
FISH		
Black surfperch	1	0
Blacksmith	2	0
California barracuda	1	0
California morey eel	1	0
California sheephead	3	0
Garibaldi	1	0
Giant kelpfish	0	1
Halfmoon	20	0
Jackmackerel	2	0
Kelp bass	3	1
Opaleye	15	0
Pacific mackerel	3	1
Pacific sardine	2	0
Sebastes spp.	0	1
Senorita	1	0
Topsmelt	4	0
BIRDS		
California gull	5	0
Heerman's gull	2	0
Pacific loon	1	0
Sooty shearwater	1	0
Western gull	10	0
Western grebe	1	0
MAMMALS		
California sea lion	1	5

APPENDIX A. (cont'd.)

Table 5. Minimum numbers of bald eagle prey items and percent diet composition using all sampling methods on Santa Catalina Island, California, from December 1991 through July 1993.

Food Item	N	Individuals	
		% of Total ^a	% of Taxon ^a
<u>FISH</u>			
Unknown fish	305	52.1	61.2
Top Smelt (<i>Atherinops affinis</i>) or California grunion (<i>Leuresthes tenuis</i>)	47	8.0	9.4
Unknown surfperch (various sp.)	33	5.6	6.6
Kelp bass (<i>Paralabrax clathratus</i>)	29	5.0	5.8
California barracuda (<i>Sphyraena argentea</i>)	9	1.5	1.8
Blacksmith (<i>Chromis punctipinnis</i>)	9	1.5	1.8
Garibaldi (<i>Hypsypops rubicundus</i>)	6	1.0	1.2
Halfmoon (<i>Medialuna californiensis</i>)	6	1.0	1.2
Unknown mackerel (<i>Scomber spp.</i> , <i>Trachurus spp.</i>)	7	1.2	1.4
Opaleye (<i>Girella nigricans</i>)	5 ^b	tr	1.0
Unknown rockfish (<i>Sebastes spp.</i>)	4 ^b	tr	tr
Pacific sardine (<i>Sardinops sagax</i>)	4	tr	tr
California flyingfish (<i>Cypelurus californicus</i>)	4	tr	tr
Pacific mackerel (<i>Scomber japonicus</i>)	4	tr	tr
California moray eel (<i>Gymnothorax mordax</i>)	3	tr	tr
California sheephead (<i>Semicossyphus pulcher</i>)	4	tr	tr
Horn shark (<i>Heterodontus francisci</i>)	4	tr	tr
Skipjack tuna (<i>Katsuwonus pelamis</i>)	2	tr	tr
Pacific bumper (<i>Chloroscombrus orqueta</i>)	2	tr	tr
Spiny dogfish (<i>Squalus acanthias</i>)	2 ^b	tr	tr
Yellow croaker (<i>Umbrina roncadore</i>)	2	tr	tr
Giant kelpfish (<i>Heterostichus rostratus</i>)	1 ^b	tr	tr
Brown smoothhound (<i>Mustelus californicus</i>)	1	tr	tr
White surfperch (<i>Phanerodon furcatus</i>)	1	tr	tr
Calico surfperch (<i>Amphistichus koelzi</i>)	1	tr	tr
California halibut (<i>Paralichthys californicus</i>)	1	tr	tr
Unknown shark (Class Elasmobranchii)	1	tr	tr
Zebra perch (<i>Hermosilla azurea</i>)	1	tr	tr
Fish Subtotal	498	85.1	

APPENDIX A. (cont'd.)

Table 5. (cont'd.) Minimum numbers of bald eagle prey items and percent diet composition using all sampling methods on Santa Catalina Island, California, from December 1991 through July 1993.

Food Item	N	Individuals	
		% of Total ^a	% of Taxon ^a
<u>BIRDS</u>			
Unknown birds	18	3.1	28.6
Western gull (<i>Larus occidentalis</i>)	11	1.9	17.5
Heermann's gull (<i>Larus heermanni</i>)	1	tr	1.6
Surfbird (<i>Aphriza virgata</i>)	1	tr	1.6
Black-vented shearwater (<i>Puffinus opisthomelas</i>)	1 ^b	tr	1.6
Sooty shearwater (<i>Puffinus griseus</i>)	5 ^b	tr	7.9
Arctic loon (<i>Gavia arctica</i>)	3 ^b	tr	4.8
Common murre (<i>Uria aalge</i>)	3	tr	4.8
Northern fulmar (<i>Fulmarus glacialis</i>)	2 ^b	tr	3.2
Western/Clark's grebe (<i>Aechmophorus occidentalis</i> , or <i>A. clarkii</i>)	2	tr	3.2
Xantus' murrelet (<i>Synthliboramphus hypoleucus</i>)	3	tr	4.8
Barn owl (<i>Tyto alba</i>)	1 ^b	tr	1.6
California gull (<i>Larus californicus</i>)	1	tr	1.6
Ring-billed gull (<i>Larus delawarensis</i>)	1 ^b	tr	1.6
Brandt's cormorant (<i>Phalacrocorax pencillatus</i>)	1 ^b	tr	1.6
Cassin's auklet (<i>Ptychoramphus aleuticus</i>)	2	tr	3.2
Common raven (<i>Corvus corax</i>)	2	tr	3.2
European starling (<i>Sturnus vulgaris</i>)	1	tr	1.6
Red phalarope (<i>Phalaropus fulicarius</i>)	1	tr	1.6
Redhead duck (<i>Aythya americana</i>)	1	tr	1.6
Unknown shearwater (<i>Puffinus griseus</i> or <i>P. creatopus</i>)	1	tr	1.6
Unknown gull (<i>Larus spp.</i>)	1	tr	1.6
Birds Subtotal	63	10.8	

APPENDIX A. (cont'd.)

Table 5. (cont'd.) Minimum numbers of bald eagle prey items and percent diet composition using all sampling methods on Santa Catalina Island, California, from December 1991 through July 1993.

Food Item	N	Individuals	
		% of Total ^a	% of Taxon ^a
<u>MAMMALS</u>			
Unknownmammals	2	tr	16.7
California sealion (<i>Zalophus californianus</i>)	6 ^d	1.1	50.0
Feral goat (<i>Capra hircus</i>)	3	tr	25.0
Harbor seal (<i>Phoca vitulina</i>)	1 ^b	tr	8.3
Mammals Subtotal	12	2.1	
<u>INVERTEBRATES</u>			
Unknown invertebrates	1	tr	8.3
Squid (<i>Loligo spp.</i>)	11	1.9	91.7
Invertebrate Subtotal	12	2.1	
Total Food Items	585 ^c	100.0	

^atr=trace amount representing less than 1% of the total.

^bSpecies that were described only from nest or feeding perch remains.

^cTo prevent double counting of prey remains, total food items is less than the sum of foraging observations, nest observations, perch remains and nest remains.

^dThe number of California sea lions represents the total number of individuals observed being fed upon by bald eagles. The total number of times eagles were observed to feed on these carcasses is 13.

APPENDIX A. (cont'd.)

Table 6. Percent diet composition by month for bald eagles on Santa Catalina Island, California, from December 1991 to July 1993. These data represent results using observations methods only.

Month	Fish (%)	Bird (%)	Mammal (%)	Invertebrate (%)
January (n=5)	80.0	0.0	0.0	20.0
February (n=7)	57.1	0.0	42.9	0.0
March (n=21)	57.1	23.8	9.5	9.5
April (n=68)	82.3	14.7	1.5	1.5
May (n=230)	89.6	8.3	0.4	1.7
June (n=141)	87.3	10.6	0.7	1.4
July (n=36)	97.2	0.0	0.0	2.8
August (n=14)	100.0	0.0	0.0	0.0
September (n=7)	85.7	0.0	14.3	0.0
October (n=12)	58.3	8.3	33.3	0.0
November (n=6)	50.0	16.7	33.3	0.0
December (n=5)	80.0	0.0	0.0	20.0

APPENDIX A. (cont'd.)

Table 7. Percent diet composition for individual eagles (n = total number of prey) on Santa Catalina Island, California from December 1991 through July 1993.

Territory *	Eagle Identification	Fish (%)	Bird (%)	Mammal (%)	Invertebrate (%)
PR	K40 (n=30)	83.3	13.3	3.4	0.0
PR	K65 (n=80)	96.2	2.5	1.3	0.0
PR	U-PR (n=12)	75.0	25.0	0.0	0.0
SR	K00 (n=22)	72.7	4.6	9.1	13.6
SR	K67 (n=33)	75.8	9.1	9.1	6.1
TR	CHA (n=5)	100.0	0.0	0.0	0.0
TS	K22 (n=16)	81.2	12.5	6.3	0.0
WE	AF (n=11)	100.0	0.0	0.0	0.0
WE	WEF (n=16)	93.8	6.3	0.0	0.0
WE	WEM (n=48)	89.6	4.2	0.0	6.3
WE	U-WE (n=38)	97.4	0.0	2.6	0.0
- ^b	K13 (n=1)	0.0	0.0	100.0	0.0
- ^b	K25 (n=7)	0.0	0.0	100.0	0.0

*PR = Pinnacle Rock territory, SR = Seal Rocks territory, TR = Twin Rocks area, TS = Torqua Springs area, WE = West End territory, U = Unknown bird.

^b Juvenile eagles without an established territory.

APPENDIX A. (cont'd.)

Table 8. Numbers of prey items, and whether all prey items could be identified to species, for each data collection method used for a bald eagle food habits study on Santa Catalina Island, California, from December 1991 through July 1993.

Method*	No. Fish	No. Bird	No. Mammal	No. Invertebrate	All Prey Identified to Species
NR	12	14	3	0	NO
PR	8	4	1	1	NO
FO	15	4	2	1	NO
NO	24	8	0	1	NO

* NR = nest remains, PR = perch remains, FO = foraging observations, NO = nest observations.

Table 9. Percent diet composition by observation method for bald eagles on Santa Catalina Island, California, from December 1991 through July 1993.

Sampling Method	Fish (%)	Bird (%)	Mammal (%)	Invertebrate (%)
Foraging Observations (n=96)	74.0	4.2	16.7	5.2
Nest Observations (n=457)	88.4	10.3	0.0	1.3
Prey Remains (n=76)	43.4	50.0	5.3	1.3